



July 21, 2005

BY ELECTRONIC FILING

Ms. Marlene M. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

**Re: Notification of Oral Ex Parte, In re Petition of: Remington
Arms Company, Inc. For Waiver of Sections 15.245, 15.247(b)
and 15.247(e) of the Rule and Regulations, ET Docket No. 05-
183**

Dear Ms. Dortch:

Cisco's *ex parte* letter of July 19, 2005 was accompanied by a presentation that purported to show an analysis of the interference potential posed by the use of the Eyeball R1 to a nearby wireless LAN. That analysis is flawed in several respects, is potentially misleading, and should not be relied upon in assessing the merits of Remington's waiver request. Below Remington sets forth basic flaws in the Cisco analysis.

The interference predicted by Cisco would not be caused by the rule waiver. Cisco's analysis is based on a required signal-to-noise ratio analysis that does not take into account the nature of the interfering signal — only the power of that signal.¹ Remington is not asking for a waiver of the maximum power limit in 15.247. Rather,

¹ We note that the Cisco analysis is generally consistent with 802.11 interference calculations offered on the Cisco web site. See: http://www.cisco.com/en/US/products/hw/wireless/ps430/products_technical_reference_chapter09186a008043a3e8.html and http://www.cisco.com/en/US/products/hw/wireless/ps4555/products_data_sheet09186a00801ebc29.htm. Those calculations also make no distinction between interference from analog sources (such as microwave ovens) and digital sources (such as cordless telephones).

Remington is asking for a waiver of the digital modulation requirement. Cisco's interference analysis would be unchanged if the Eyeball R1 used digital modulation as currently allowed by the rules.

The interference predicted by Cisco is much more severe than that measured by Alion. In science and engineering facts always trump theory. As shown below, Cisco's interference analysis is flawed theory. Indeed, the best proof that their theory is flawed is given by the measurements in the independent study conducted by Alion and reported earlier in its report submitted in this proceeding by Remington. Without benefit of a live test, Cisco predicts interference indoors if the separation between a subject 11 Mbps LAN and the Eyeball R1 is less than 40 meters. Alion *observed* no interference with a separation of only three meters. Similarly, Cisco predicts interference outdoors if the separation is less than 155 meters; Alion *observed* no interference at a separation of 37 meters but did observe interference at a separation of 34 meters.

The Cisco analysis fails to consider antenna diversity or MIMO. Many wireless LAN base stations as well as some wireless LAN adapter cards have dual antennas and automatically switch to take the signal with the better signal-to-noise ratio.² Given the severe multipath environment that wireless LAN users often encounter such diversity can substantially aid performance. It is not unreasonable to expect that, in an indoor situation, fading of the signal from the Eyeball R1 and the wireless LAN would be essentially independent. Thus, in many locations the interfering signal from the R1 would be deeply faded but the wireless LAN signal would be unfaded. Antenna diversity allows wireless LANs to automatically seek out such locations. It is likely that such fading, caused by multipath effects, was the reason that Alion's indoor measurements of interference showed both (1) operation of the Eyeball R1 and wireless LANs in close proximity and (2) variability in the interference effects of the Eyeball R1 on the wireless LAN.

Multiple-input multiple-output technologies (MIMO) are now incorporated into wireless LANs.³ MIMO permits the receiving antenna system to be preferentially steered towards the desired signal and away from interference.

The Cisco analysis fails to take into account the flexibility and automatic fallback characteristics of 802.11. High-speed 802.11 LANs have automatic rate selection capabilities—matching the data rate to the available signal-to-noise ration. Assuming, *arguendo*, that Cisco's analysis were correct, at the maximum distance they calculate the Eyeball R1 would interfere with 54 Mbps operation the effect of interference from the Eyeball R1 would be to drive operation from 54 Mbps down to 48 Mbps. Admittedly, a 10% loss in LAN throughput is a loss but it is not a catastrophic loss.

² See <http://www.dlink.com/products/resource.asp?pid=11&rid=34&sec=0> for an example of an adapter card with antenna diversity.

³ See http://newsroom.cisco.com/dlls/2005/hd_020805.html for a reference to an announcement of a MIMO WLAN product.

Summing up. Cisco's interference analysis is not based on the requested waiver — rather Cisco's analysis would apply equally well to a digital Eyeball R1. Cisco's analysis is contradicted by actual measurements taken by an independent laboratory — probably because Cisco failed to consider the impact of diversity and multipath on LAN operation. Cisco modeled interference as an on/off proposition rather than taking into account the variable data rate capabilities of wireless LANs.

Moreover, nowhere has Cisco taken into consideration the extraordinary circumstances in which the Remington R1 would be deployed.

Should you have any further questions concerning this matter, kindly communicate directly with the undersigned.

Respectfully submitted,



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